to admit air into the base for supplying the combustion-chamber with oxygen.

E represents a cylindrical valve-casing fitted snugly in a correspondingly-shaped opening in the cylinder-head C. This casing contains the valve for controlling the oil and air passage which supplies the combustible fluid to the combustion-chamber B′, and also contains the exhaust-valve controlling the exhaust-ports through which the products of combustion are discharged.

e represents the supply-pipe for the compressed air, and *e′* is the oil-supply pipe, both of which enter the head e^2 of the valve-casing at its side and communicate with a central receiving-chamber e^3, formed in the head of the valve-casing, the oil-pipe being arranged near the bottom of the receiving-chamber and the air-pipe near the top thereof. The receiving-chamber e^3 is closed at its upper end by a head e^4, provided with a stuffing-box, and communicates at its bottom with a passage e^5, formed in a stem e^6, depending centrally from the head e^2.

f represents the oil and air induction valve arranged in the receiving-chamber e^3 and seated in the tapering bottom of the latter, so as to close the passage e^5. The valve *f* is held on its seat by a spring *f′*, surrounding the upwardly-extending valve-rod f^2 and bearing with its ends against the induction-valve and the head e^4. The valve-rod passes upwardly through the stuffing-box of the head e^4, and is provided at its upper end with a thumb-nut f^3, which bears on the upper side of a rock-lever F, pivoted to the standard f^4. The induction-valve *f* is raised from its seat at regular intervals by this lever, to allow the oil and compressed air to pass from the receiving-chamber into the passage e^5.

e^7 represents a tube secured to the lower end of the hollow stem e^6 and forming an extension of the passage e^5. The lower end of the tube e^7 is provided with a deflecting-cup e^8, which is arranged slightly below the open end of the tube and provided between the latter and its upturned marginal flange with a cover e^9, of finely-perforated sheet metal or wire-gauze. The cup receives the oil and air from the passage e^5 and tube e^7 and deflects the mixture upwardly, while the gauze cover divides the mixture into a finely-divided spray, which is the most favorable condition for instantaneous ignition and combustion.

G represents a burner secured to the side of the cylinder and arranged in the combustion-chamber directly in the path of the upwardly-sprayed oil, so as to ignite the same instantly.

e^{10} represents a concave disk about half the diameter of the cylinder and secured to the tube e^7 at its point of junction with the hollow stem e^6. This disk, which becomes intensely heated by the combustion of the successive charges in the combustion-chamber, intercepts any particles of the upwardly-sprayed fuel which may escape ignition, and instantly converts them into vapor and causes them to be consumed with the rest of the charge.

H represents the circular exhaust-valve, provided with an upwardly-extending sleeve *h*, which surrounds the valve-stem e^6 and is capable of vertical movement thereon. The peripheral face of the exhaust-valve tapers upwardly and fits a correspondingly-shaped seat *h′*, formed at the lower end of the valve-casing. The interior cavity of this valve-casing, whose lower end is closed by the exhaust-valve, forms an exhaust-chamber h^2.

h^3 represents an exhaust-passage surrounding the valve-casing on the inside of the water-jacket of the cylinder-head, and h^4 are ports formed in the sides of the valve-casing, so as to establish communication between the exhaust-chamber and the exhaust-passage.

The cylinder B and its head C are both provided with water-jackets *c c′*, to avoid excessive heating. The cylindrical body of the valve-casing extends through the water-jacket of the cylinder-head, and is secured thereon by bolts *e″*.

h^5 represents two rods whereby the exhaust-valve is actuated, and which pass vertically through openings in the head of the valve-casing and engage with their lower hooked ends in an annular groove h^6, formed in the sleeve *h*. The rods h^5 are connected at their upper ends by a bar h^7, which bears against the lower side of the rock-lever F, and by which the rods are lowered and the exhaust-valve is opened. The latter is held on its seat by means of springs h^8, which surround the rods h^5 and bear with their ends against the cross-bar h^7 and the head of the valve-casing. The exhaust-valve is opened periodically by the descent of the lever F, and allows the products of combustion after each explosion to be discharged into the exhaust-chamber, thence into the exhaust-passage through the ports h^4, and thence into an exhaust-pipe h^9.

The induction-valve and exhaust-valve are actuated alternately by the rock-lever F. In the position shown in Fig. 3 the lever F is in its normal position, in which position both the induction and exhaust valves are closed. For the purpose of admitting the liquid fuel to the combustion-chamber, the rock-lever is quickly raised above its normal position and returned to the same. This movement of the rock-lever opens the induction-valve momentarily and causes a quantity of liquid fuel to be delivered into the combustion-chamber by a gust of compressed air. For the purpose of exhausting the products of combustion, the rock-lever is lowered beyond its normal position, whereby the exhaust-valve is opened.

The burner G for igniting the charges of sprayed fuel is arranged horizontally in the combustion-chamber and secured to the cylinder by means of a tube *g*, which supplies oil and air to the burner. The tube *g* is screwed into the end of a plug *g′*, which is